

Influence of processing on microstructure and properties of copper reinforced with ceramic particles

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Abstract

Composites materials consisting of pure copper reinforced with 1 and 2vol. % of Si₃N₄, ZrC, ZrB₂ and TiB₂ were prepared in order to determine the influence of the reinforcing particles on the mechanical and electrical properties. Water atomized powders of pure copper were blended with the ceramic particles to achieve a homogeneous mixture. Different milling times and a ratio weight ball to powder of 5:1 and 10:1 were used. The resulting powders were consolidated by hot pressing under 90MPa for 2 h at a low temperature (650°C) to obtain materials with a fine microstructure. For comparative purpose, resulting material were divided in two pieces and one of them was hot rolled at 800°C with 20% reduction for eliminating residual porosity and increasing the bonding between particles. It was found that the microstructure and properties of composite materials can be increase with the amount of Fe, Cr, C and O incorporated as impurities during milling. The nature of these reinforcing particles and parameter used for milling has only a minor influence on the properties of the final product.

Keywords: Metal-matrix composites (MMCs); Electrical resistivity; Hardness, Microstructures; Hot Pressing.